Dawson College: Calculus II (SCIENCE): 201-NYB-05-S03003: Winter 2013

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Quiz 10

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(2 marks)* §8.1 #8 Find a formula for the general term a_n of the sequence, assuming that the pattern of the first few terms continues.

$\{5, 8, 11, 14, 17, \ldots\}$ $a_n = 5 + 3(n-1)$

Question 2. *(4 marks)* §8.1 #30 Determine whether the sequence converges or diverges. If it converges, find the limit.

$a_n = \dfrac{(\ln n)^2}{n}$

Let $f(x) = \dfrac{(\ln x)^2}{x}$

$\lim_{x\to\infty} f(x)$

$= \lim_{x\to\infty} \dfrac{(\ln x)^2}{x}$ l.f. $\dfrac{\infty}{\infty}$

$\overset{H}{=} \lim_{x\to\infty} \dfrac{2\ln x \cdot \frac{1}{x}}{1}$

$= \lim_{x\to\infty} \dfrac{2\ln x}{x}$ l.f. $\dfrac{\infty}{\infty}$

$\overset{H}{=} \lim_{x\to\infty} \dfrac{2(\frac{1}{x})}{1}$

$= 0$

$\therefore a_n \to 0$ as $n \to \infty$

Question 3. *(4 marks)* §8.1 #28 Determine whether the sequence converges or diverges. If it converges, find the limit.

$a_n = \dfrac{\sin 2n}{1+\sqrt{n}}$

a_n

$\| $

$\dfrac{-1}{\sqrt{n}} \leq \dfrac{-1}{1+\sqrt{n}} \leq \dfrac{\sin 2n}{1+\sqrt{n}} \leq \dfrac{1}{1+\sqrt{n}} \leq \dfrac{1}{\sqrt{n}} = c_n$

$\|$

b_n

$\lim_{n\to\infty} \dfrac{-1}{\sqrt{n}} = 0 = \lim_{n\to\infty} \dfrac{1}{\sqrt{n}}$

$\therefore$ by the squeeze theorem

$a_n \to 0$ as $n \to \infty$.